

Table 1. Physical and geometrical model parameters.

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Thickness of the fluid layer, $D$	$2.9 \times 10^6$ m
Outer radius, $R_o$	$6.37 \times 10^6$ m
Temperature contrast, $T_b - T_o$	1600 K
Reference density, $\rho_o$	$3.3 \times 10^3$ kg m $^{-3}$
Thermal conductivity	$3.0$ W m $^{-1}$ K $^{-1}$
Thermal diffusivity, $\kappa$	$10^{-6}$ m $^2$ s $^{-1}$
Acceleration of gravity, $g$	$10$ m s $^{-2}$
Thermal expansion, $\alpha$	$2.0 \times 10^{-5}$ K $^{-1}$
Average viscosity in the transition zone (410-670 km)	$\sim 4.0 \times 10^{21}$ Pa·s
in the upper mantle (120-410 km)	$\sim 4.0 \times 10^{20}$ Pa·s
in the oceanic lithosphere* (0-120 km)	$\sim 2.0 \times 10^{23}$ Pa·s
Viscosity of the continent (0-120 km)	$2.0 \times 10^{25}$ Pa·s
Equilibrium depth for the endothermic phase change	$6.7 \times 10^5$ m
Equilibrium temperature for the endothermic phase change	1400 K
Clapeyron slope for the endothermic phase change	-3.5 MPa K $^{-1}$
Density jumps across the phase change boundaries	8.5%
Phase transition widths, $d$	$3.2 \times 10^4$ m
( $\mu_o$ , $c_1$ , $c_2$ , $n$ , $\tau_t$ ) $^\ddagger$ for the lower mantle	( $2\eta_r$ , 3.0595, 0.75647, 1, $\tau_t$ )
the transition zone	( $0.4\eta_r$ , 3.0595, 0.75647, 1, $\tau_t$ )
the upper mantle $^\S$	( $0.02\eta_r$ , 1.9187, -1.177, 3, $\tau_t$ )
the oceanic lithosphere	( $\eta_r$ , 1.9187, -1.177, 3, $\tau_t$ )

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Remarks: \* For oceanic plates, the cutoff for the maximum viscosity is  $4.0 \times 10^{23}$  Pa·s.

$^\ddagger$   $\tau_t$  is 2.5 bar;  $\eta_r$  is reference viscosity and is  $2.0 \times 10^{22}$  Pa·s.

$^\S$   $\mu_o$  for slabs within the upper mantle is equal to that for the oceanic plate,  $\eta_r$ .